

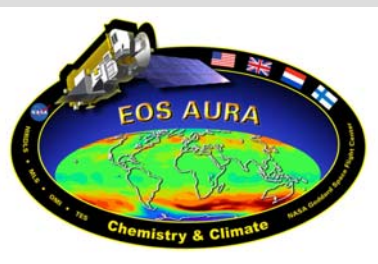
# Meteorological Data Products in OMI Data Product Retrievals

**Pepijn Veefkind, Henk Eskes, Mark Kroon**  
**KNMI – The Netherlands**

**Aura Science Team Meeting**  
**Workshop on Meteorological Data Products**  
**11 August 2006**

## **Content**

**L1-L2 retrievals**  
**Data Assimilation**  
**CTM models**



# Input for L1-L2 Retrievals



## Ozone [O3] column

Temperature and Ozone profile climatology  
Monthly zonal means, based on TOMS V8 climatology  
To generate Air Mass Factor Look Up Table  
Effective O3 absorption temperature fit variable

## Nitrogen di-oxide [NO2] column

Slant column calculated for fixed temperature  
Tropospheric Air Mass Factor calculations using NCEP temperature profile climatology  
Temperature profiles weigh temperature dependent absorption cross section

## Aerosols [AOD,SSA]

Sun Glint calculation uses wind speed climatology  $1^\circ \times 1^\circ$  res (lat, lon)

## Clouds O2-O2 [fraction, height]

DOAS fit yields O2-O2 absorption depth and continuum  
Calculate cloud fraction and cloud height Look Up Table  
Incorporate standard atmospheric profile (AFGH mid-latitude summer)

## Ozone [O3] profile

ECMWF temperature profiles, 0 UTC and 12 UTC update,  $2^\circ \times 3^\circ$  res (lat, lon)

# Data Assimilation



## Ozone data assimilation

Chemical transport Model = TM (TM3, TM5)

Input = OMI TO3c data + ECMWF data

OMI TO3c data = OMDOA03, Near-Real-Time and operational data

ECMWF data = Temperature, pressure, wind fields

ECMWF data = Forecast, analysis

Output = 2D (+ 3D) analyses and forecasts

Time resolution = 6 hours (presently) + 1 hour for special customer (UV-index)

Spatial resolution = total column ozone maps on 1.25 by 1 degree

## Forecasts

Operational forecast are performed daily, based on:

- The latest ECMWF 10-day medium-range weather forecast meteo
- The KNMI ozone assimilation software "TM3DAM"
- The latest near-real time OMI DOAS retrieval data from today-yesterday



## Global ozone field forecasts



The near-real time [total ozone columns](#), derived from observations by SCIAMACHY, are input to a data assimilation program which provides near-real time ozone fields for today and a forecast for the coming days.

Postscript files of these forecasts can be found [here](#)

### Tropospheric data products

[Air pollution monitoring](#)

[UV radiation monitoring](#)

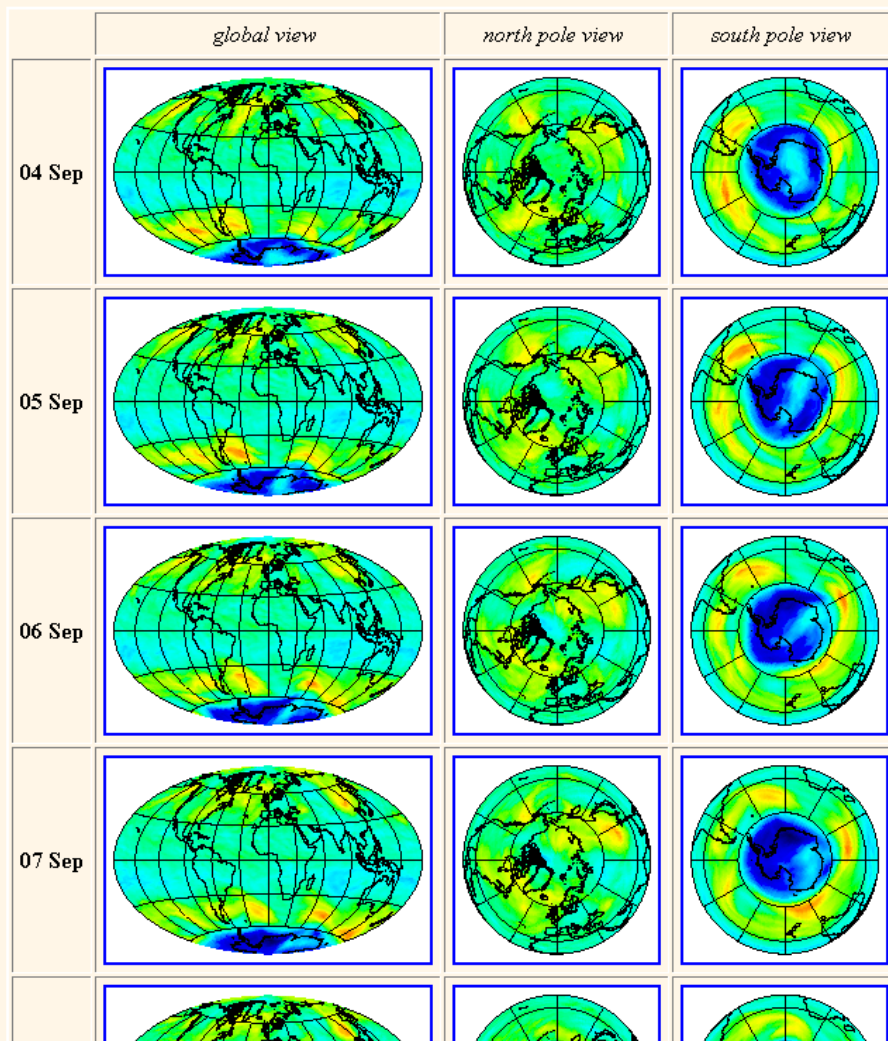
[Support to Protocol monitoring](#)

O<sub>3</sub>  
- [total column](#)  
- [global field](#)  
BrO  
- [global field](#)

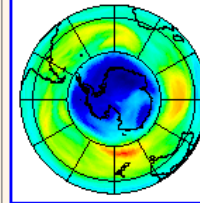
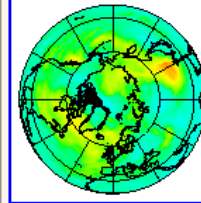
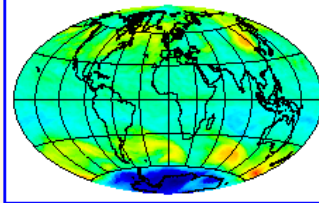
[Support to Aviation control](#)

[Contact](#)

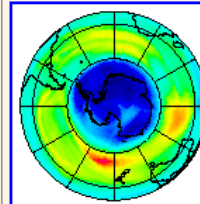
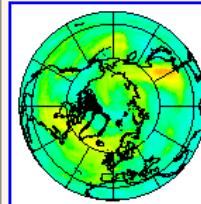
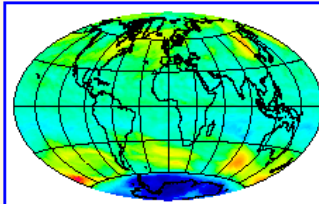
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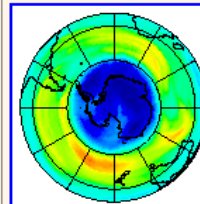
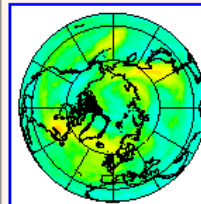
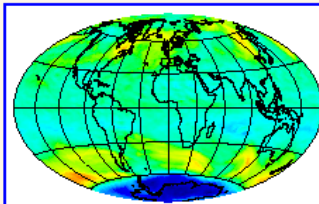
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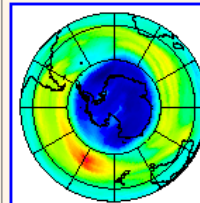
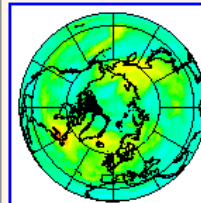
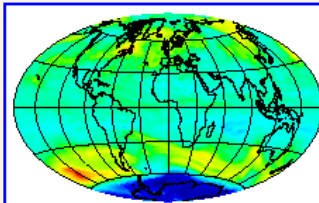
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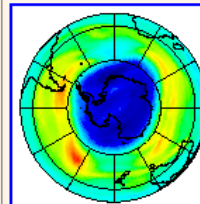
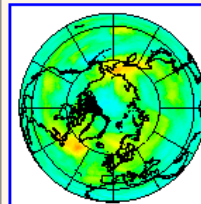
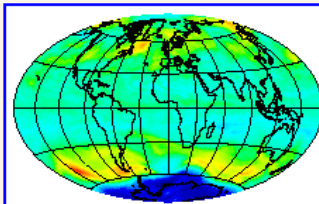
10 Sep



11 Sep



12 Sep



archive of daily images: [individual days](#) | [all days of a month](#)



## Near-real time NO<sub>2</sub> tropospheric column estimation

Based on:

- OMNO2A near-real time NO<sub>2</sub> slant columns + OMI cloud parameters
- Space-time collocated tropospheric model profiles from daily TM4 chemistry-transport model runs (approx 40 species, focus on troposphere)
- Space-time collocated ECMWF temperature profiles
- Assimilation of slant columns to force the TM4 stratosphere to be consistent with the OMI obs. This analyzed stratosphere is subtracted from the total column to determine tropospheric sub-column.
- Radiative transfer software for the tropospheric and stratospheric AMF

## Input

ECMWF operational meteorological analyses and forecast  
to drive TM4 + operational assimilation

ECMWF fields = Temperature, wind, moisture, surface parameters, clouds ...

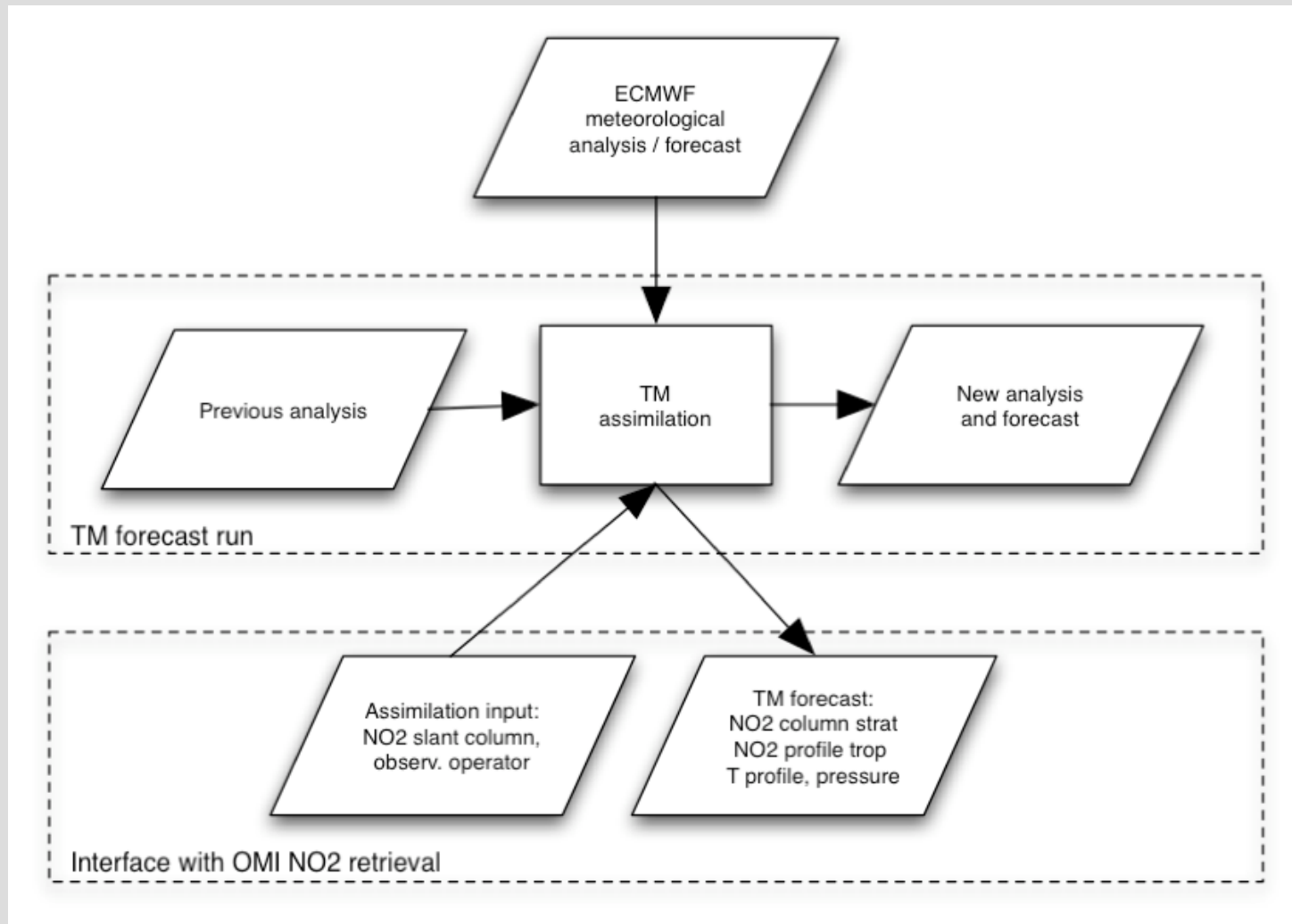
## Output

Profile estimations fed to L1-L2 retrievals

NO<sub>2</sub> total and tropospheric column retrievals

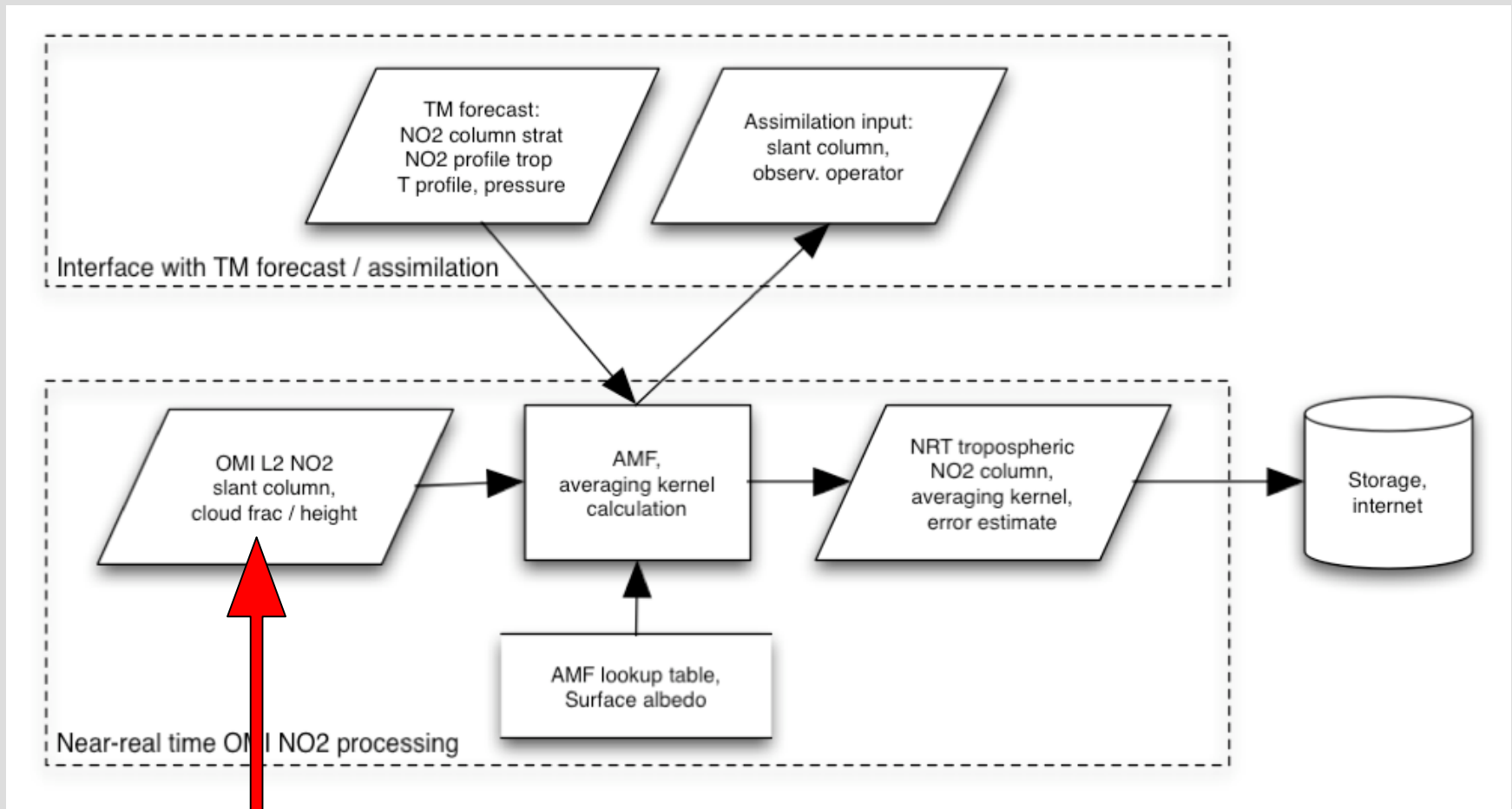
## Ingredient 1:

### Daily chemical forecast with OMI NO2 assimilation



## Ingredient 2:

### Near-real time OMI tropospheric NO2 retrieval



NASA/KNMI DOAS algorithm



# Regional Tropospheric NO2 columns from OMI



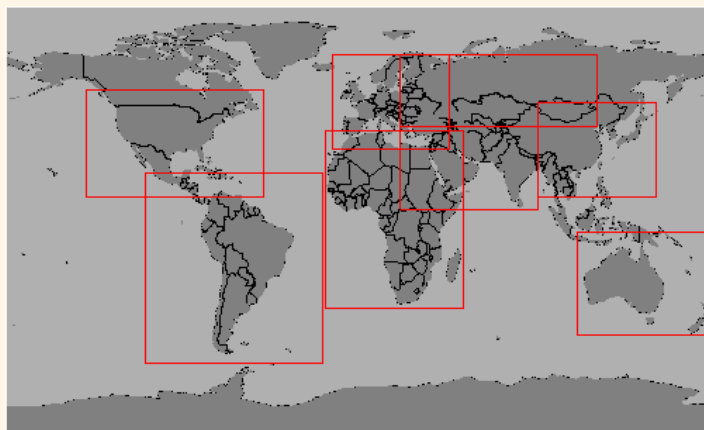
[Tropospheric NO2](#)

## regional monthly mean

Region:   
Year:   
Month:   
Day:

Access the archive of regional Tropospheric NO2 columns based on OMI measurements by selecting a region and a date in the menu on the left. The location of the available regions is shown in the figure below. If you click on either of these regions, you get the image for that region of the last available date.

Data is available for the dates 01 January 2005 to 30 September 2006.



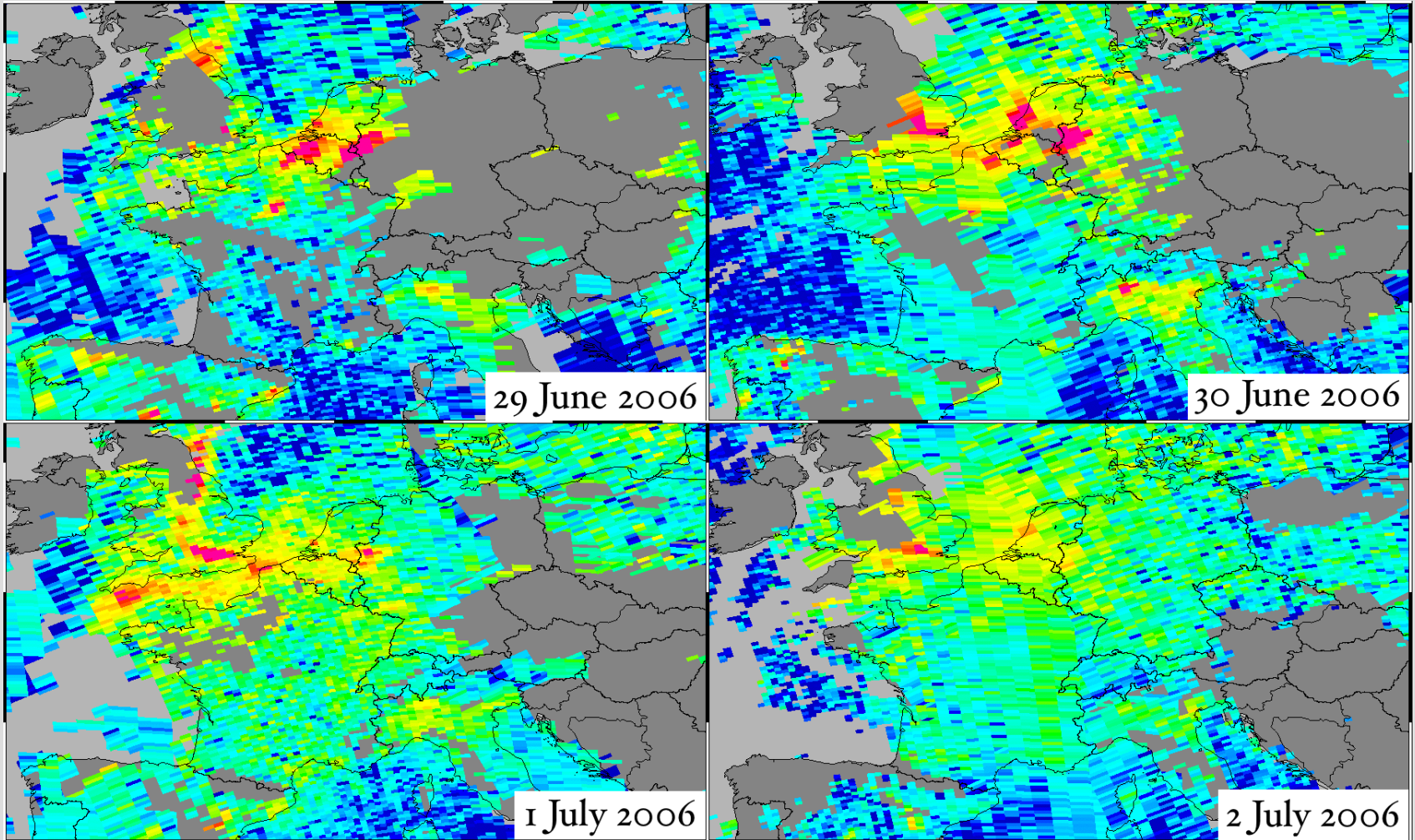
last modified: 10 February 2006  
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<http://www.temis.nl/airpollution/no2col/no2regioomi.php>

# OMI trop NO<sub>2</sub>, 30 Jun - 2 Jul 2006

Thursday

Friday



Saturday

Sunday